

INTERNATIONAL SEARCH REPORT

Inten Application No
PCT/GB2004/004136

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B41J2/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B41J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 362 610 A (* SEIKO INSTRUMENTS INC) 28 November 2001 (2001-11-28)	1-9, 12, 13
Y	page 8, line 11 - page 11, line 8; figures 1-4	10, 11, 14, 15
X	DE 38 20 082 A1 (FUJI ELECTRIC CO., LTD., KAWASAKI, KANAGAWA, JP) 29 December 1988 (1988-12-29)	6-9
A	column 4, line 18 - column 5, line 25; figures 1,2,3c	16-21
X	US 5 686 946 A (MIZUTANI ET AL) 11 November 1997 (1997-11-11)	16-21
A	column 3, line 29 - column 5, line 64; figures 2,5a,7a	6-9
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the International filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the International filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *G* document member of the same patent family

Date of the actual completion of the International search

21 March 2005

Date of mailing of the International search report

21. 04. 2005

Name and mailing address of the ISA

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 869 002 A (BROTHER KOGYO KABUSHIKI KAISHA) 7 October 1998 (1998-10-07) column 5, line 48 - column 7, line 44; figures 1-4	16-21
Y	US 6 260 937 B1 (SUGAHARA HIROTO) 17 July 2001 (2001-07-17) column 1, line 64 - column 2, line 13 column 3, line 38 - column 8, line 51 figures	10,11, 14,15
A	US R E36 667 E (PATON ANTHONY D ET AL) 25 April 2000 (2000-04-25) column 14, line 12 - line 32 column 15, line 34 - line 36 figure 9	1-21
A	US 6 188 416 B1 (HAYES DONALD J) 13 February 2001 (2001-02-13) column 5, line 54 - line 58 figures 3,4a	1-21
A	US 6 033 059 A (WEN XIN ET AL) 7 March 2000 (2000-03-07) column 5, line 5 - line 26 column 5, line 64 - column 6, line 6 figures 3,15,17	1-21
T	EP 0 943 439 A (EASTMAN KODAK COMPANY) 22 September 1999 (1999-09-22) paragraph '0029!	10,11, 14,15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2004/004136

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5,12,13

OBJECTIVE PROBLEM : achieving equal acoustic properties in two offset channels; SOLUTION : each droplet ejection channel being offset relative to the central plane with respect to the adjacent channel; arranging that the acoustic wave reflection coefficient of the boundary between the first channel and the manifold is equal to that of the boundary between the second channel and the manifold;

2. claims: 6-9

OBJECTIVE PROBLEM : actuator type suitable for two offset channel groups; SOLUTION : a first group of channels being offset relative to the central plane in a first offset direction orthogonal to the central plane and a second group of channels being offset relative to the central plane in a second offset direction orthogonal to the central plane; actuators comprising respective regions of piezoelectric material with electrodes connected to receive drive signals; a channel end profile, with a conductive track extending over at least part of the channel end profile of each channel, these conductive tracks carrying drive signals to the electrodes.

3. claims: 10,11,14,15

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

OBJECTIVE PROBLEM : compensating for different acoustic properties in two offset channel groups; SOLUTION : a first group of channels being offset relative to the central plane in a first offset direction orthogonal to the central plane and a second group of channels being offset relative to the central plane in a second offset direction orthogonal to the central plane; a first electrical drive circuit for providing a first drive waveform for actuating channels of the first group of channels and a second electrical drive circuit for providing a second drive waveform for actuating channels of the second group of channels, the first drive waveform differing from the second drive waveform in that extent necessary to ensure equal velocity of drop ejection from a channel of the first group and a channel of the second group.

4. claims: 16-21

OBJECTIVE PROBLEM : structure channels; SOLUTION : an actuator plate comprising a plurality of channels, each of said channels having a predetermined length d1 a portion of said length having a constant depth and a portion pf said length having a changing depth; a nozzle plate providing an end wall of said actuator channels.

INTERNATIONAL SEARCH REPORT

Intern Application No
PCT/GB2004/004136

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